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The other islands about New Zealand also supply similar data.¹⁸ In studying these floras WILLIS contends that through this hypothesis one is able to prophesy that the plants which reach outlying islands will be on the whole the oldest, and therefore the most widespread upon the mainland, and finds, on examining the facts, that the prophecy is completely fulfilled. The facts presented seem to support the contention and lead the author to restate the hypothesis thus: "The area occupied at any given time, in any given country, by any group of allied species at least ten in number, depends chiefly, so long as the conditions remain reasonably constant, upon the age of the species of that group in that country, but may be enormously modified by the presence of barriers such as seas, rivers, mountains, change of climate from one region to the next or other ecological boundaries, and the like, also by the action of man, and by other causes. In other words, age and area is the chief positive, the action of barriers the chief negative, factor in plant distribution, while in recent times the action of man has become of greater importance than either."—GEO. D. FULLER.

Gases and germination.—KIDD¹⁹ has studied the effect of various partial pressures of carbon dioxide and oxygen upon the sprouting of potatoes, and concludes that "(1) Oxygen is harmful to the potato tuber in concentration of about 5-10 per cent; oxygen 80 per cent kills in 4-5 weeks; oxygen 5-10 per cent is the optimal concentration for sprouting. (2) The harmful action of oxygen is increased in the presence of carbon dioxide. (3) Carbon dioxide inhibits sprouting in a concentration of 20 per cent. This concentration is at the same time to some extent harmful. (4) Higher concentrations of carbon dioxide cause marked injury and death." NOBOKIRCH has found that actively growing plant organs grow faster in oxygen pressures considerably below that of the normal atmosphere, but that such reduced pressures finally prove injurious, due to accumulation of metabolic products; while at normal oxygen pressures no such injury occurs. This may throw in question KIDD's interpretation that pressures above 10 per cent are injurious, especially for pressures up to the normal atmosphere. In general, due to their coats and other coverings, seeds are reduced in rate and percentage of germination by any reduction of oxygen pressure below the normal atmosphere, and often favored by greater oxygen pressures. Some of the work of APPLEMAN has indicated that oxygen supply is a limiting factor to germination of the potato, quite in contrast with KIDD's results. It is interesting that carbon dioxide showed no forcing action due to its anaesthetic properties. It is possible that it did cause increases in respiration, while not increasing or

¹⁸ WILLIS, J. C., The floras of the outlying islands of New Zealand and their distribution. *Ann. Botany* 33:267-293. 1919.

¹⁹ KIDD, FRANKLIN, Laboratory experiments on the sprouting of potatoes in various gas mixtures. *New Phytol.* 18:248-252. 1919.

even injuring growth as do some other anesthetics with the potato. In work of this kind one should be very sure that the gases used carry no other injurious gases.—WM. CROCKER.

Modification of unit characters.—An epoch in the perennial controversy between "mutationists" and "selectionists" is marked by CASTLE's²⁰ shift from the latter to the former school. This investigator has previously held a leading place among "selectionists," with his modification by selection of the hooded character of rats. His change in point of view has been effected mainly by some of his own results. The cross between his plus race (+3.73) of hooded rats and a wild race brought a reduction in the grade of the hooded character as it appeared in the extracted hooded F_2 young. Repeated recrossing of these extracted individuals with the wild race finally resulted in extracted hooded rats of the grade +3.04. CASTLE concluded that the hooded character had been modified to this degree by its successive contacts with the germ plasm of the wild race. More recently he crossed his minus race (-2.63) with the same wild race. Repeated F_2 extractions showed successively the grades -0.38, +1.01, +2.55, and one family reached +3.05. These results indicate clearly that the hooded character in the plus and minus races are identical, only the multiple modifying factors differing. Repeated crosses with the wild race eventually produced hooded individuals whose quota of modifying factors approximated that of the wild race, evidently represented by a grade of +3.04 or +3.05. Consistent with the idea of a single unit for the hooded character and multiple modifying factors, the successive hooded populations that were extracted showed a decreasing degree of variability.—M. C. COULTER.

Rainfall efficiency.—The well known fact that plant foliage intercepts a considerable amount of the rainfall has been emphasized recently by MCLEAN²¹ and others. A decidedly valuable contribution to the subject is represented by the extensive data of HORTON,²² who has shown that the average observed interception during the summer of 1918 was 40 per cent of the precipitation. This loss ranges from 25 per cent for rains of long duration to 100 per cent for light showers, and seems to be nearly the same for most broad-leaved trees during the summer. These interception losses are greater for needle-leaved trees than for broad-leaved ones. Although the data are still insufficient to make an accurate comparison of the losses occurring at different seasons of the year, it is clear that since light showers are most frequent during the summer season the losses will be greatest during such a period, or in other

²⁰ CASTLE, W. E., Piebald rats and the theory of genes. *Proc. Nat. Acad. Sci.* 5:126-130. *fig. 1.* 1919.

²¹ MCLEAN, R. C., Studies in the ecology of tropical rain-forest. *Jour. Ecol.* 7:121-172. 1919.

²² HORTON, R. E., Rainfall interception. *Mo. Weather Rev.* 47:603-623. *figs. 17.* 1919.